

## A landmark publication on the amphibians of northern Eurasia

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Sergius L. KUZMIN *The amphibians of the former Soviet Union* Sofia, Bulgaria, Pensoft Publishers,  
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In the early 1990's, I was contacted by Kraig Adler of Cornell University to see if I would be interested in working with a Russian colleague on a book on the status of amphibians in the territory of the recently dissolved Soviet Union. I did not know Sergius KUZMIN at that time, and I only reluctantly agreed in order to learn more about the amphibians of that vast territory which until recently had been *terra incognita* to most western batrachologists. Our collaboration proceeded harmoniously, however, and we eventually co-edited a series of publications on the amphibians of Russia and the countries making up the former Soviet Union (KUZMIN et al., 1995, KUZMIN & DODD, 1996, 1997).

During the course of our collaboration, Sergius asked me to help edit another venture, a book on the biology of the amphibians of the former Soviet Union. Previous field guides on Soviet herpetology were badly out-of-date. In addition, because of the language barriers and the difficulty in obtaining references, much of the primary literature was inaccessible to scientists outside of Russia and the 14 other present-day countries comprising the former Soviet Union. In order to fill this vacuum, he had written a German-language book entitled *Die Amphibien Russlands und angrenzender Gebiete* (1995), and he hoped to publish an English version to further reach scientists in the West. The original English language edition was never published, although the work was completed in the mid-1990's. Perhaps that was just as well. The present book, greatly expanded from the original version, contains a wealth of information on nearly every aspect of the biology and life history of the 41 species now known from the Baltic Sea to the Russian Far East, from Siberia to the high mountains and deserts of Kazakhstan. This is truly a remarkable work.

The book is organized into chapters as follows: Chapter 1, *History*; Chapter 2, *Faunistics and geography*; Chapter 3, *Ecology*; Chapter 4, *Anthropogenic pressure and conservation*; and Chapter 5, *Keys for species identification*. Chapter 6 is actually a series of detailed accounts for all 41 species of amphibians found throughout the northern Eurasian continent; this section, comprising 300 pages, makes up the greatest part of the book. The book has 65 pages of references covering hundreds of articles. Titles in Russian or other languages of the former Soviet Union (e.g. Georgian, Azerbaijani) are translated into English. Maps of habitats, species richness and amphibian distributions (based on an atlas grid) are followed by color plates showing habitats and species, including multiple life-history stages, a glossary of terms, species and subject indexes, and a list of species and subspecies with their original authors. Although the color plates are sequestered at the end of the book, black and white photos are liberally placed throughout the main body of the text, especially in the species accounts.

In the *Preface*, KUZMIN describes the purpose of the book (i.e. a state-of-the-art rendering of Soviet batrachology in such a manner as to introduce non-Soviet scientists to the literature and scope of research on amphibians) in order to set the stage for the information that follows. He provides line drawings and

descriptions of the morphology of both adult and larval amphibians. These serve as a guide to morphological nomenclature and to the methods by which amphibian measurements are presented in the text (e.g., salamanders were measured from the snout to the anterior portion of the vent). Chapter 1 outlines the history of amphibian research in Russia, beginning with folk legends and paleo-art and extending through the great explorations of Pallas and Kessler, to the foundations of modern amphibian studies, that is, the works of Strauch, Nikolsky and Terentjev. The chapter concludes with a summary of modern amphibian research throughout Russia and the former Soviet Union; this section is invaluable to western researchers as a guide to the extent of amphibian research currently underway and who is conducting it. The history of herpetological research is usually passed over superficially in regional or national texts as various researchers' publications and contributions are discussed. I often wonder about who these people were, what motivated them to chase amphibians at times of great difficulties in travel and social upheavals. After reading Chapter 1, I wish I had the language skills to read some of the biographies available on Russian herpetologists (e.g., MAZURMOVICH, 1983), especially those working during and in the decades immediately after World War II.

Chapter 2 accords an extensive review of biogeography, faunal assemblages and habitat types throughout northern Eurasia. I found this section somewhat tedious, with lists and lists of cold northern habitats and the species that live within them. KUZMIN documents long-term changes in distribution patterns with explanations of how species can disperse or populations can be extirpated in rather short periods of time. He generally rejects rapid dispersion as accounting for new distribution records in favor of an explanation involving the discovery of relictual populations. Such an explanation seems reasonable, although later in the species accounts he notes some rather dramatic range expansions associated with human activity, such as the expansion of *Rana ridibunda* in southern European Russia and Kazakhstan.

Chapter 3 summarizes general amphibian ecology, from activity cycles and reproduction to feeding (Kuzmin's particular specialty) and population structuring. As a semi-tropical resident, I found this section interesting because of its discussion of life histories in, of necessity, extremely cold climates. The diverse ways in which amphibians complete the vital functions of growth and reproduction in a short period of time in a cold climate often mirror the ways they adapt to an unstable (in terms of hydroperiod and seasonal breeding patterns) subtropical environment. Similar development, and life history plasticity sometimes occur in response to northern cold and subtropical drought, despite our differences in temperature. For example, amphibians living in unstable or extreme environments in Russia and Florida both respond to stress by a decrease in the length of the larval period, and salamandrids in both regions sometimes remain neotenic, when hydroperiods permit, in order to take advantage of favorable feeding and thermal conditions.

I was intrigued by KUZMIN's assertion that "the duration of active life probably is genetically determined to a greater extent than the total life span which includes inactive periods of hibernation". If this is true, would not northern populations of a species live longer than more southern populations? Unfortunately, the lack of references to empirical data impedes examination of this hypothesis (see below). I was also intrigued to learn that exceptionally large larval *Rana ridibunda* become sexually mature after overwintering and prior to metamorphosis. Perhaps gonads could enlarge prior to metamorphosis, but to say that such tadpoles are truly "sexually mature" indicates imprecise terminology (R. ALYTES, personal communication). In any case, endocrinologists and evolutionary biologists should be interested in a frog that develops a mature hormonal system, in part, prior to metamorphosis and when breeding is impossible.

In Chapter 4, KUZMIN presents information on the general status of amphibians in the former Soviet Union. As in most of the industrialized world, habitat destruction and alteration have led to localized declines, and habitat loss has a potential for greatest impact in regions containing species of limited distribution. In addition, collection for pets and teaching, the ubiquitous presence of pollution and toxic chemicals, highway mortality, and the general litany of the ills of modern society have substantially impacted many species, especially now that legal protection has eroded as a result of a lack of enforcement due to a crumbling economic situation. Declines do not seem to be mysterious, as they have been represented in North and Central America and Australia, nor, surprisingly, does disease appear to have figured prominently in declines. Likewise, malformations do not seem widespread although they occur occasionally, such as in the vicinity of Chernobyl. Because of the remoteness of much of the former Soviet Union and the limited number of amphibian enthusiasts monitoring populations, is the lack of

such reports good news or does it merely reflect sampling bias? KUZMIN provides an extensive review of the conservation of all taxa, including their status in the former republics and their presence in nature reserves. Most species are found in at least a few reserves, except, unfortunately, for the rare salamander *Ranodon sibiricus*. The likely negative effects of extensive social upheaval on the protection and management of the reserves, however, does not invoke cause for optimism.

Chapter 5 is a short chapter devoted to identification. Keys are given not only for mature adults, but also for egg masses and larvae. The keys are accompanied by line drawings of high quality (by N. V. Pantelev), although the lack of color makes distinguishing one gray tadpole from another difficult. Color plates would have greatly enhanced the utility of the keys. Unfortunately, the larvae of some of these species are virtually impossible to distinguish, and there is a great deal of regional color and morphological variation. The numbering system used in the supposedly dichotomous keys is confusing and difficult to follow. I was at a loss in the latter parts of it. Further, there are no drawings of tadpole mouth parts, although these are sometimes used as key characters.

The species accounts are what makes the book invaluable. Nearly everything that one might want to know is covered in depth, at least as far as research in the former Soviet Union is concerned. Each account contains sections on synonymy, names in several languages, taxonomic notes, description, karyology, distribution, subspecific differentiation and variability, ecology (habitats and abundance, thermobiology and activity cycles, reproduction, development, feeding, natural enemies, parasites and diseases), influence of anthropogenic factors, status and conservation, and references (by name and date). The topics are covered comprehensively, and KUZMIN presents alternative points of view, such as when describing taxonomic interpretations of the *Rana macrocnemis* complex or the enigma of *Hynobius turkestanicus*. There is a wealth of information here, information which will give Eurasian batrachologists a great deal to ponder in the coming decades (a subterranean *Proteus* in the Crimean Peninsula, perhaps?). In the species accounts, Kuzmin has certainly fulfilled his promise to present the scope of Soviet research on amphibians available to the English-speaking world. The sheer volume of the literature summarized also leads to the book's major flaw, however.

Given the extensive review of the Soviet literature presented by KUZMIN, it is unfortunate that it is impossible to determine the source of information in the text. This is because all literature citations are included at the back of the chapters or species accounts, rather than in the text. Thus, the readers do not know, nor can they determine whether they are evaluating Kuzmin's personal opinion, the results of his research, or statements based on the empirical research or opinions of others. Fortunately, the tables and some of the figures contain original literature citations. Still, the book would have been much more useful had all the citations been included directly in the text so that the original papers could be connected with the data presented.

There are a few additional problems. For example, a map of the former Soviet Union is presented on page 466; it should have been placed earlier in the book. Although country boundaries are lightly outlined, there are no maps of provinces, districts, or the autonomous republics often mentioned in the text. One not familiar with the geography and political units of Russia, especially, cannot determine where some of the locations referred to in the text are found. The species distribution maps are not labeled at all in terms of place. The text could have been edited better, as there are a number of words that either aren't correct or don't quite make sense: e.g., type "territories" for type localities (p. 2), "semi flowing" waters (meaning streams with only seasonal flow), "Ecological" (p. 43), "fisheries" for hatcheries (p. 382), "forest rades" (?). The lack of articles (the, a, an) in the Russian language sometimes carries over into the text, and there are a few words (e.g., "synanthropization") that I have never heard of! Still, for such a large work on a complex subject, *The amphibians of the former Soviet Union* is a remarkably easy and enjoyable book to read, especially when compared to most English language works emanating from the former Soviet Union. When the entire book is considered, these criticisms are minor.

*The amphibians of the former Soviet Union* is a landmark publication in the history of the herpetology of the former Soviet Union, an invaluable reference source, and a much needed compilation of the biology of amphibians across northern Eurasia. It belongs in the library of everyone interested in the biology of Eurasian amphibians, and has much to offer batrachologists throughout the world. I highly recommend it despite the price, which is steep by North American standards. Sergei KUZMIN has provided

the foundation upon which modern studies of the amphibians of this vast territory will be based for a long time to come. Fortunately for biologists fluent in Russian, a Russian language version was issued by the Russian Academy of Sciences in 1999.

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